UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/559,932 | 12/08/2005 | Masaki Okamura | 126722 | 9579 |

25944 7590 10/21/2008

OLIFF & BERRIDGE, PLC
P.O. BOX 320850
ALEXANDRIA, VA 22320-4850

| EXAMINER | |
|---|---|
| LUO, DAVID S | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2837 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 10/21/2008 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/559,932 | OKAMURA ET AL. | |
| | Examiner | Art Unit | |
| | DAVID S. LUO | 2837 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *09 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/26/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,679,346 to Raftari, and further in view of U.S. Patent Application Publication No. 2002/0145401 to Sato.

As to claim 1, Raftari teaches a motor drive apparatus (Raftari fig. 1: 52 "Transaxle Management Unit" or TMU 52 & fig. 2, col. 5:lines 22 – col. 6:lines 9), comprising: a permanent magnet motor (Raftari fig. 1: 30 "Generator Motor" and 38 "Traction Motor"); and a controller (Raftari fig. 1: TMU 52 and col. 5: lines 12 – 18) that estimates an amount of demagnetization of the permanent magnet motor based on a voltage control amount (Raftari col. 5: lines 14-19 "a voltage sensor incorporated in generator motor 30 and a voltage sensor in traction motor 38 determine a voltage that is proportional to the magnetization of permanent magnets in generator motor 30 and traction motor 38"); and limits an output of the permanent magnet motor when the estimated amount of demagnetization is larger than a predetermined value (Raftari: col. 3: lines 45-48 "If the indication of magnetism reaches a predetermined threshold, the motor is made inoperable and/or a current to the motor is limited to prevent damage to components". It should also be noted that amount of demagnetization can be easily obtained from the indication of

magnetism as disclosed by Raftari) wherein the controller (i) obtains a reference value that is the voltage control amount in a case where the permanent magnet motor is not demagnetized, according to a current and a motor revolution number of the permanent magnet motor being controlled, and (ii) estimates the amount of demagnetization based on a comparison between the reference value and an actual value under the control of the voltage control amount (Raftari col. 3: lines 34 – lines 45 " The device includes a voltage monitor that detects a permanent magnet induced voltage. The voltage monitor is coupled to a processor that receives the permanent magnet induced voltage and compares the permanent magnet induced voltage to a reference voltage that reflects the permanent magnet induced voltage for the motor with a fully magnetized permanent magnet"). Raftari does not teach a method to obtain a voltage and current control amount for the q axis of the permanent magnet motor by using a d-q axis transformation. Sato teaches a method to obtain a voltage and current control amount for the q axis of the permanent magnet motor by using a d-q axis transformation (Sato fig. 4 and page 1: [0007] and [0010]).

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Sato into Raftari since Raftari suggests a method of determining the amount of demagnetization based on the comparison between the reference voltage and the detected permanent magnet induced voltage (Raftari: abstract and col. 3 lines 34—col. 4 lines 10) and Sato suggests the beneficial use of the vector control for motor drive such as the d-axis current and q-axis current to be controlled independently of each other in the analogous art of electric motor drive control.

As to claim 2, Raftari in view of Sato teaches a motor drive apparatus as claimed in claim 1, further comprising a converter (Raftari fig. 2: 106 and 108) changing an input voltage

necessary for driving said-the permanent magnet motor (Raftari fig. 2: 102 and 104 which are the motor voltage feedback signals fed back to the control processor 100), wherein the controller corrects the estimated amount of demagnetization according to a level of the input voltage (Raftari fig. 4 and col. 6: lines 33-37 where a method is taught for determining and compensating for permanent magnet degradation [demagnetization] in a PM motor).

As to claim 3, Raftari in view of Sato teaches a motor drive apparatus as claimed in claim 1, wherein the controller estimates the amount of demagnetization based on which one of the reference value and the actual value under the control of the voltage control amount is larger (Raftari col. 3: lines 37 – 48 where a method is taught to determine the permanent magnet degradation [demagnetization] by comparing the reference voltage and the actual induced voltage ).

As to claim 4, Raftari in view of Sato teaches a motor drive apparatus as claimed in claim 3, wherein the controller holds a map that is configured based on a relationship between the voltage control amount of the q axis and a combination of current command values of the d and q axes and the motor revolution number that are preliminarily measured in a case where the permanent magnet motor is not demagnetized, and the controller obtains the reference value from the map based on present values of the current command values of the d and q axes and a present value of the motor revolution number (Raftari col. 5: lines 11-21 and col. 3: lines 63 – col. 4: lines 5 and col. 6: lines 63 – col. 7: lines 7: lines 14 where a method is taught for TMU 52 to execute a stored program which is equivalent to a map for control purpose [col. 5 line 11] for the reference voltage/detected voltage [col. 3: line 35 and 39], current [col. 5: line 20] and the relationship between the PM induced voltage and the motor rotational speed [col. 6: line 64] ).

As to claims 5-8, Raftari in view of Sato teaches a motor drive apparatus as claimed in claim 1 and they are rejected as Raftari teaches an adaptive demagnetization compensation for a PM motor (Raftari: title) and a map method for the controller such as the reference voltage/detected voltage ([col. 3: line 35 and 39], current [col. 5: line 20] and the relationship between the PM induced voltage and the motor rotational speed [col. 6: line 64]). At the time of invention it would have been obvious to a person of ordinary skill in the art to modify the teachings of Raftari and implement the teachings of Sato into Raftari in order to obtain the invention as disclosed in these noted claims since Raftari suggests a method of determining the amount of demagnetization based on the comparison between the reference voltage and the detected permanent magnet induced voltage (Raftari: abstract and col. 3 lines 34—col. 4 lines 10) and Sato suggests the beneficial use of the vector control for motor drive such as the d-axis current and q-axis current to be controlled independently of each other in the analogous art of electric motor drive control).

3. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,679,346 to Raftari, U.S. Patent Application Publication No. 2002/0145401 to Sato and further in view of U.S. Patent Application Publication No. 2003/0062868 to Mir.

As to claims 9 and 10, Raftari in view of Sato teaches a motor drive apparatus as claimed in claim 1. Raftari in view of Sato does not teach an inverter wherein the voltage control amount is corrected by adjusting dead time of transistors in the inverter when voltage applied to the inverter changes. Mir teaches an inverter wherein the voltage control amount is corrected by adjusting dead time of transistors in the inverter when voltage applied to the inverter changes (Mir page 3: [0042] "a system and method of applying dead time to the inverter switching is

disclosed").

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to implement the teachings of Mir into Raftari in view of Sato since Raftari in view of Sato suggests a method for adaptive demagnetization compensation for a PM motor and Mir suggests the beneficial use of the PM motor dead time switching strategy to enhance motor performance such as reducing torque ripple (Mir page 6: [0057]) in the analogous art of PM motor drive control technology.

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

5. Applicant's arguments filed 07/09/2008 with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David Luo
Art Unit 2837

/BENTSU RO/

Primary Examiner, Art Unit 2837